

**AMENDMENTS TO THE DRAWINGS:**

Replacement Sheets 1-9 are being submitted with this Amendment A in order to replace originally filed sheets 1-7 and the figures present thereon, including Figure 6. Applicants respectfully submit these Replacement Sheets address all issues raised by the Office with respect to Figure 6.

As requested by the Office, Figure 6 has been amended to clearly display what is referred to as drawing detail 114. As noted in [0038] of applicants' specification, drawing detail 112 refers to the entire nodule while drawing detail 114 refers to a grain within the nodule. As amended, and with the benefit of the specification, the person of ordinary skill can determine what is referred to by these drawing details. Accordingly, reconsideration of the objection to Figure 6 is respectfully requested.

## **REMARKS**

Applicants respectfully request reconsideration and allowance of the pending claims.

### **I. Status of the Claims**

Upon entry of this Amendment A, claims 1, 3-12 and 64 remain pending in this application, while claims 2 and 13-62 have been canceled.

Claims 1-5 and 12 have been amended herein to more particularly claim certain embodiments, to correct minor typographical errors, and/or to correct claim dependencies therein. Support for the amendment to claim 1 may be found in claim 2, as originally filed. Support for the amendment to claims 3-5 may be found, for example, in claim 1 as originally filed. Support for the amendment to claims 12 may be found, for example, in claim 13 as originally filed.

Finally, claim 64 has been added. Support for this new claim may be found, for example, in claim 12 as originally filed, as well as the combination of claims 13 and 23 as originally filed.

### **II. Elections/Restrictions**

Claims 13-62 have been canceled in response to the Restriction Requirement dated June 2, 2006. As previously noted, Applicants respectfully reserve the right to pursue the subject matter of these canceled claims in one or more divisional applications.

With respect to claim 16, it is to be noted that Applicants submit that this claim properly depends from claim 13, and that it was only due to a typographical error that it was included in the claims of elected Group I, rather than the claims of non-elected Group II.

III. Double Patenting

Claim 16 has been canceled by this Amendment A. Applicants therefore respectfully submit the Double Patenting objection related thereto is moot.

IV. Claim Objections

Claim 4 has been amended using the language proposed by the Office. Reconsideration of the objection to claim 4 is therefore respectfully requested.

Inasmuch as claim 16 has been canceled by this Amendment A, Applicants respectfully submit the objection related thereto is moot.

V. 35 U.S.C. §102(b) Rejections

A. Claims 1, 5, 6, 10, 11 and 12

Reconsideration is requested of the rejection of claims 1, 5, 6, 10, 11 and 12 under 35 U.S.C. §102(b) as being anticipated by Howard et al. (U.S. Patent No. 4,476,002).

Claim 1, from which claims 5, 6, 10, 11 and 12 depend, is directed to a metal-air cell cathode assembly. In relevant part, the claimed cathode assembly comprises:

an active layer including longitudinally extending electrically conducting wires interwoven with laterally extending electrically conducting wires that intersect at joints to form a mesh, and **a metal comprising nickel deposited onto the wires that bonds the longitudinally extending wires to the laterally extending wires at the joints** to form a screen.

Accordingly, it is to be noted that claim 1 requires a **deposited metal** comprising nickel which **bonds** the wires at the joints. As noted in the present application (see, e.g., paragraph [0039]), the wires are bonded to one another in this way to form a single

metallurgical unit, thus providing an electrical contact or connection therebetween. The present invention thus eliminates the need for a rolling step in preparing the screen. As a result, the screen avoids the disadvantages associated with fabricating a conventional rolled screen, which include the additional time and expense associated with the rolling process, as well as the undesirable flattening of the screen when rolled. (See, e.g., paragraph [0004].)

Howard et al. disclose a method of preparing a metal current carrier, such as a wire mesh screen, which comprises coarse metal particles thereon, wherein the wire mesh screen is first coated with an adhesive such as rubber based glue, and then metal particles are applied to the adhesive in a manner that coats the metal screen. The resulting, metal-particle coated screen is heated to sinter the particles to each other, and the screen. Howard et al. state that the metal particles will ordinarily be composed of the same metal as in the screen. Additionally, they state that nickel particles may be used.

Notably, however, Howard et al. **fail to disclose** a wire mesh that is **bound together by a deposited metal comprising nickel**. More specifically, they do not disclose or suggest that sintering causes the, for example, nickel particles to bond the wires at their joints, so as to form a single metallurgical unit, nor would such a process be expected to cause such bonding because the temperatures of the sintering process is not high enough to cause the nickel to melt.<sup>1</sup> Rather, the disclosed process involves applying a temperature that is high enough to redistribute the metal particles deposited thereon to increase the density thereof, but not high enough to melt the metal particles.<sup>2</sup> After sintering, the screen is then passed through a calender roller to further compress the particles. Finally, a catalyst is applied to the surface of the sintered and rolled screen.

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<sup>1</sup> Significantly, Howard et al. sinter nickel at 1100°C. (See, e.g., col. 5, line 40.) The melting point of nickel is substantially higher than that, 1453°C (see, e.g., Sigma Aldrich catalogue online at <http://www.sigmaaldrich.com/catalog/search/ProductDetail/RIEDEL/13631>).

<sup>2</sup> *v. sin·tered, sin·ter·ing, sin·ters v. tr.* To cause (metallic powder, for example) to form a coherent mass by heating without melting. *v. intr.* To form a coherent mass by heating without melting. *The American Heritage® Dictionary of the English Language, Fourth Edition*. Retrieved September 18, 2006, from Dictionary.com website: <http://dictionary.reference.com/search?q=sinter>.

It is noted that Howard et al. disclose electroplating the resulting sintered and rolled screen. However, this is done to deposit a catalyst to the surface thereof, and specifically a noble metal catalyst, such as platinum, gold or silver, for the subsequent decomposition reaction of hydrogen peroxide. Notably, **no reference** is made to the electroplating of **nickel** on the screen surface. Furthermore, **no reference** is made, either specifically or inherently, to a screen wherein the joints of the metal wires therein are **bonded** by a deposited metal comprising nickel.

In view of the foregoing, Applicants respectfully request reconsideration of the rejection of claim 1, inasmuch as Howard et al. clearly fail to disclose each and every limitation of claim 1; namely, they fail to disclose a metal screen wherein the joints thereof are bonded together by a deposited metal comprising nickel. Applicants therefore respectfully submit claim 1 is novel over the cited reference.

Inasmuch as claims 5, 6, 10, 11 and 12 depend directly or indirectly from claim 1, these claims are submitted as novel for the same reasons as claim 1 and by virtue of the additional requirements therein. Specifically with regard to claim 6, it is to be noted that this claim requires the metal nodules comprise columnar grains. The present application indicates (see, e.g., paragraph [0038]) that the nodules are substantially parallel to each other, and extend substantially normal to, and outwardly from, the surface of the wires. These nodules thus form a rough topography for the wires, thereby increasing the surface area of the screen. Notably, these columnar grains do not result from "the relationship of the particle size and the mesh spacing," as asserted by the Office on page 4 of the present Office action. Rather, these columnar grains result from the method of depositing the nickel particles, such for example by electroplating, electroless deposition, chemical deposition, or sputtering. Howard et al. **do not disclose** that their particles comprise columnar grains.

#### **B. Claims 3 and 4**

Reconsideration is requested of the rejection of claims 3 and 4 under 35 U.S.C. §102(b) as being anticipated by Howard et al. (U.S. 4,476,002) .

Claims 3 and 4 depend from claim 1 and are therefore submitted as novel for the same reasons as claim 1; that is, Howard et al. fail to disclose each and every element of claim 1, and thus of claims 3 and 4. Additionally, these claims are submitted as novel over the Howard et al. because they do not disclose a wire screen which has the joints thereof bonded together by a deposited metal comprising nickel, wherein that metal is deposited by electroplating (claim 3), or by electroless deposition, sputter deposition, or chemical deposition (claim 4).

VI. 35 U.S.C. §103 Rejections of Claims 3, 4 and 7-9 based on Howard et al.

Reconsideration is requested of the rejection of claims 3, 4 and 7-9 under 35 U.S.C. §103 as being obvious in view of Howard et al. (U.S. Patent No. 4,476,002) alone.

Claims 3, 4 and 7-9 depend directly or indirectly from claim 1. Accordingly, for all of the reasons set forth above, Applicants respectfully submit Howard et al. **fail to disclose or suggest each and every element** of these claims. Applicants further submit that Howard et al. does not render the features of claims 3, 4 or 7-9 obvious, because a person of ordinary skill in the art would have **no motivation** to (i) modify the method by which the, for example, nickel particles are placed on or attached to the surface of the wire screen, or (ii) substitute **a metal comprising nickel** for the precious metals noted therein (e.g., platinum, gold, and silver), in order to bond the joints of the wires of the metal screen together, because Howard et al. simply **fail to disclose or suggest** the importance of bonding the wires together in this way. Stated another way, Howard et al. do not specifically disclose, and furthermore fail to provide any **motivation** for, the preparation of such a screen because they simply make **no reference** to the value or importance of a screen wherein the joints thereof are bonded together by a deposited metal comprising nickel.

Additionally, it is to be noted that claim 7 depend from claim 6, while claims 8 and 9 depend from claim 5. Both claims 5 and 6 are directed to the metal nodules; claim 5 requires that the deposited metal form nodules that protrude outwardly from the surface of the wire, while claim 6 requires that the nodules comprise columnar grains. As noted

above, the present application indicates (see, e.g., paragraph [0038]) that the nodules are substantially parallel to each other, and extend substantially normal to, and outwardly from, the surface of the wires. These nodules thus form a rough topography for the wires, thereby increasing the surface area of the screen. Notably, Howard et al. **do not disclose or suggest** that their particles form nodules that protrude outwardly from the surface of the wire, or that the particles comprise columnar grains.

Accordingly, Applicants respectfully submit that the Office has failed to meet its burden in establishing a *prima facie* case of obviousness here, because either (i) each and every element of the claims have not been disclosed or suggested by Howard et al., and/or (ii) motivation is simply not provided by Howard et al. to prepare such a screen.<sup>3</sup>

## VII. Other Rejections Under 35 U.S.C. §103

### A. Claims 1, 3, 10 and 12 based on Kadija et al. and Venkatesan et al.

Reconsideration is requested of the rejection of claims 1, 3, 10 and 12 under 35 U.S.C. §103(a) as being obvious in view of Kadija (U.S. Patent No. 4,435,252) and Venkatesan et al. (U.S. Patent No. 6,998,184).

Claim 1, from which claims 3, 10 and 12 depend, is directed to a **metal-air cell cathode assembly** that, in relevant part, comprises:

**an air diffusion layer** that receives air and delivers the received air to the cathode assembly, and

**an active layer including longitudinally extending electrically conducting wires interwoven with laterally extending electrically conducting wires** that intersect at joints to form a mesh, and a metal comprising nickel deposited onto the wires that bonds the longitudinally extending wires to the laterally extending wires at the joints to form a screen.

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<sup>3</sup> As set forth in M.P.E.P. §2143, in order for the Office to establish a *prima facie* case of obviousness, three basic criteria must be met: (1) the prior art references, when combined, must teach each and every element of the claim; (2) there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to combine or modify the references; and (3) there must be some reasonable expectation of success.

Significantly, the invention defined by claim 1 is a metal-air cell cathode assembly that includes an air diffusion layer. Additionally, the invention defined by claim 1 requires longitudinally extending electrically conducting wires interwoven with laterally extending electrically conducting wires that intersect at joints to form a mesh. By defining the wires as being longitudinally extending and laterally extending, the wires of the mesh are accordingly arranged in a grid.

As previously noted, as set forth in M.P.E.P. §2143, in order for the Office to establish a *prima facie* case of obviousness, three basic criteria must be met: (1) the prior art references, when combined, must teach each and every element of the claim; (2) there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to combine or modify the references; and (3) there must be some reasonable expectation of success. Applicants respectfully submit the Office has failed to establish a *prima facie* case of obviousness, because either (i) each and every element of the claims have not been disclosed or suggested, and/or (ii) motivation is simply not provided to prepare such a screen.

To begin, it is to be noted that a reference needs to qualify as prior art under §102 in order to be fairly cited in a §103(a) obviousness rejection. (See, e.g., MPEP 2141.01 Part I.) The subsections of §102 that pertain to prior art include §§102(a), (b), (e), and (g)(2).<sup>4</sup> In this case, it is to be noted that the present application has a priority date of **August 1, 2003**, while the Venkatesan et al. patent has a priority date of **August 7, 2003** and a publication date of **February 10, 2005**. Applicants therefore respectfully submit the Venkatesan et al. reference has been improperly cited here, because it does not qualify as prior art under any of §§102(a), (b), (e), or (g)(2) and therefore cannot be used in a §103(a) obviousness rejection.

Since Venkatesan et al. does not qualify as prior art, the present rejection is understood to rely solely upon Kadija et al. Kadija et al. focus their disclosure on a reticulate electrode. The disclosed reticulate electrode is manufactured by randomly distributing nickel filaments having curvature onto a support fabric. (See, e.g., figure 2

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<sup>4</sup> §§102(c) and (f) do not pertain to prior art, and §102(g)(1) pertains to interferences. Accordingly, §§102(c), (f), and (g)(1) do not apply to this analysis.



and column 2, lines 48 to 67.) Since the curved nickel filaments are randomly distributed, there may be a plurality of contact points between adjacent filaments. The filaments are then bonded together by electroplating nickel. Notably, because the electrode prepared by Kadija et al. is composed of randomly distributed filaments having curvatures, the electrode does not form a grid of longitudinally extending and laterally extending wires. Although Kadija et al. do disclose a mesh electrode in Comparative Example A, they clearly **teach away** from such an electrode by emphasizing that their electrode performs significantly better than the mesh electrode.

Furthermore, it is to be noted that Kadija et al. **do not disclose or suggest** using their electrode, or the electrode in Comparative Example A, with an air diffusion layer in a metal-air cell, or cathode assembly. In fact, **they do not even reference** a metal-air cell, or cathode assembly comprising an air diffusion layer. Rather, Kadija et al. state that their reticulate electrodes are useful for the electrolysis of aqueous solutions of ionizable compounds. (See, e.g., column 1, lines 11-21.) Accordingly, Applicants respectfully submit that a person of ordinary skill in the art would not have been motivated to employ the reticulated electrode, or the electrode of Comparative Example A, that are disclosed by Kadija et al. in a cathode in a metal-air cell in combination with an air diffusion layer for receiving air and delivering the received air to the cathode assembly. Applicants' position finds further support in that fact that, in normal use, the electrodes disclosed by Kadija et al. are used in electrolysis of aqueous solutions and therefore (1) would not be exposed to air, and/or (2) would not be required to receive air and deliver the received air to the cathode assembly.

In view of the foregoing, Applicants respectfully submit that the Office has failed to meet its burden in establishing a *prima facie* case of obviousness here, because either (i) each and every element of the claimed cathode assembly has not been disclosed or suggested by Kadija et al. **alone**, and/or (ii) motivation is simply not provided by Kadija et al. **alone** to prepare such a cathode assembly. Accordingly, reconsideration of the rejection of claim 1 is respectfully requested. Inasmuch as claims 3, 10 and 12 depend directly or indirectly from claim 1, these claims are submitted as patentable for the same reasons as those set forth for claim 1, and by virtue of the additional requirements therein.

**B. Claims 5, 6, 7, 9 and 11 based on Kadija et al. and Corrigan**

Reconsideration is requested of the rejection of claims 5, 6, 7, 9 and 11 under 35 U.S.C. §103(a) as being obvious in view of Kadija et al. (U.S. Patent No. 4,435,252) and Corrigan (U.S. Patent No. 4,663,256).<sup>5</sup>

Claims 5, 6, 7, 9 and 11 depend from claim 1 and are therefore submitted as patentable over Kadija et al. for the same reasons set forth above under Section VIII., A. for claim 1, and by virtue of the additional requirements therein. Applicants further submit that the addition of Corrigan does not overcome the failures of Kadija et al., and therefore the subject matter of these claims is also patentable over the combination of Kadija et al. with Corrigan.

Corrigan is directed to a nickel electrode, and specifically a NiOOH electrode, electrode for use in a Cd/NiOOH alkaline battery or a Zn/Ni alkaline battery. (See, e.g., the abstract, as well as column 4, lines 58-66 and column 7, lines 9-23.) The NiOOH electrodes of an alkaline battery are typically cylindrically shaped, so as to fit in standard size A, C, and D cells. Notably, Corrigan **does not disclose or suggest** using the electrode disclosed therein with an air diffusion layer in a metal-air cell, or cathode assembly. In fact, Corrigan **does not even reference** a metal-air cell, or cathode assembly comprising an air diffusion layer.

In view of the foregoing, Applicants respectfully submit that the Office has failed to meet its burden in establishing a *prima facie* case of obviousness here, because either (i) each and every element of the claimed cathode assembly has not been disclosed or suggested by the combination of Kadija et al. and Corrigan, and/or (ii) motivation is simply not provided by the combination of Kadija et al. and Corrigan to prepare such a cathode assembly. For example, it would not have been obvious to modify either of these references with an air diffusion layer because an air diffusion

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<sup>5</sup> It is to be noted that, for all of the reasons set forth above under Section VII., A., Applicants respectfully submit the Venkatesan et al. reference has been improperly cited here, because it does not qualify as prior art under any of §§102(a), (b), (e), or (g)(2) and therefore cannot be used in a §103(a) obviousness rejection.

layer is particularly suited for metal-air cells that use oxygen as the cathode material. Accordingly, an air diffusion layer has no use in either the electrolytic cell of Kadija et al. or the alkaline batteries of Corrigan.

In view of the foregoing, Applicants submit that claim 1, and therefore claims 5, 6, 7, 9 and 11 which depend therefrom, are patentable over the cited combination of references. Reconsideration of this rejection is therefore respectfully requested.

**CONCLUSION**

In view of the foregoing, Applicants respectfully request favorable reconsideration and allowance of the pending claims.

Applicants do not believe that a fee is due in connection with this response. If, however, the Commissioner determines that a fee is due, authorization is hereby given to charge Deposit Account No. 19-1345.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Derick E. Allen". The signature is fluid and cursive, with the first name "Derick" being more prominent and the last name "Allen" following in a similar style.

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